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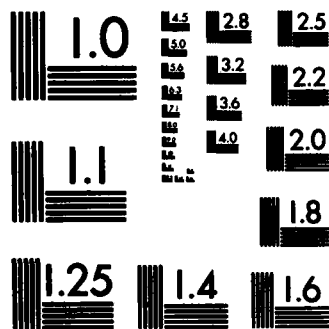
A MATHEMATICAL INVESTIGATION OF THE INDUCTION
ACCELERATION OF CONDUCTORS(U) FOREIGN TECHNOLOGY DIV
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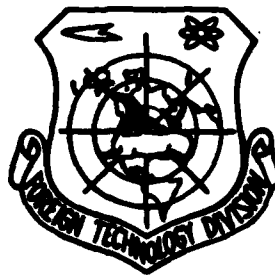
FOREIGN TECHNOLOGY DIVISION



A MATHEMATICAL INVESTIGATION OF THE INDUCTION ACCELERATION
OF CONDUCTORS

by

A.N. Andreyev, V.N. Bondaletov



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EDITED TRANSLATION

FTD-ID(RS)T-0948-83

19 September 1983

MICROFICHE NR: FTD-83-C-001162

A MATHEMATICAL INVESTIGATION OF THE INDUCTION
ACCELERATION OF CONDUCTORS

By: A.N. Andreyev, V.N. Bondaletov

English pages: 2

Source: Vysokovolt Impuls Tekhnika, Cheboksary,
Nr.1, 1972, pp: 20-21

Country of origin: USSR

Translated by: Joseph E. Pearson

Requester: FTD/TQTD

Approved for publi. release; distribution unlimited.

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WP-AFB, OHIO.

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Date 19 Sep 19 83

U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	А а	A, a	Р р	Р р	R, r
Б б	Б б	B, b	С с	С с	S, s
В в	В в	V, v	Т т	Т т	T, t
Г г	Г г	G, g	У у	У у	U, u
Д д	Д д	D, d	Ф ф	Ф ф	F, f
Е е	Е е	Ye, ye; E, e*	Х х	Х х	Kh, kh
Ж ж	Ж ж	Zh, zh	Ц ц	Ц ц	Ts, ts
З з	З з	Z, z	Ч ч	Ч ч	Ch, ch
И и	И и	I, i	Ш ш	Ш ш	Sh, sh
Й й	Й й	Y, y	Щ щ	Щ щ	Shch, shch
К к	К к	K, k	Ъ ъ	Ъ ъ	"
Л л	Л л	L, l	Ы ы	Ы ы	Y, y
М м	М м	M, m	Ь ь	Ь ь	'
Н н	Н н	N, n	Э э	Э э	E, e
О о	О о	O, o	Ю ю	Ю ю	Yu, yu
П п	П п	P, p	Я я	Я я	Ya, ya

*ye initially, after vowels, and after ъ, ы; e elsewhere.
When written as ё in Russian, transliterate as yě or ě.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh ⁻¹
cos	cos	ch	cosh	arc ch	cosh ⁻¹
tg	tan	th	tanh	arc th	tanh ⁻¹
ctg	cot	cth	coth	arc cth	coth ⁻¹
sec	sec	sch	sech	arc sch	sech ⁻¹
cosec	csc	csch	csch	arc csch	csch ⁻¹

Russian English

rot curl
lg log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

A Mathematical Investigation of the Induction Acceleration
of Conductors

Andreyev, A. N.; Bondaletov, V. N. - In the collection "High-Voltage Pulse Technology". Issue 1, Cheboksary, 1972, p. 27, 65.

This article is dedicated to the establishment of the optimum conditions of the process of the induction acceleration of conductors and to the determination of the parameters of an installation, which ensures the given acceleration (speed with a given mass) with minimum energy expenditures. The investigation of the induction acceleration of conductors, conducted with the aid of mathematical modelling, shows, that for purposes of free induction acceleration there are optimum voltage and energy storage capacity, mass, inductance, and geometrical dimensions of the hurled body. An overall decrease in the gap between the inductor and the conductor and the internal inductance of the installation is desirable for increasing the efficiency of the energy conversion of the source. The switching of additional inductance into the circuit of the accelerated body leads to a decrease in the efficiency of the acceleration process, although this decrease is not very sharp, which makes it possible to increase the speed of the conductor in accordance with the condition of maximum heating. The most limiting factors in achieving high efficiencies in the induction acceleration facilities are the active resistances of the inductor and the acceler-

ated body. For increasing the efficiency it is necessary to use conductors with high conductivity or superconductors as the materials of the inductor and the accelerated body. The shunting of the capacitors at the moment of the passage of the voltage through the zero value can lead to an increase in the efficiency only with small active resistances. The optimum acceleration conditions, other factors being equal, are obtained with the employment of a single-layer coil as the inductor. For attaining high efficiencies the path travelled by the accelerated body should exceed $(0.25-0.3) D_{cp}$, where D_{cp} is the average diameter of the coil.

Illustrations - 16, bibliographical references 9.

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